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(54) Water treatment apparatus.

(57) An apparatus for purification and/or sterilization or disinfection of water which has a head (10) with water inlet (12) and outlet (14) openings and a housing (22) secured in water tight relation to said head in which there is a cylindrical filter (18), preferably of activated charcoal. Between the filter and the housing is an outer water channel (28) communicating with the water inlet so that water entering the apparatus is purified by passing through the filter to an inner channel (30) communicating with the water outlet. Water is sterilized or disinfected by an ultraviolet lamp (20) inside the filter over which water that has passed through it flows to the water outlet. The apparatus may be used in multiples which are connected in series or parallel to obtain a greater degree of filtration and disinfection than obtainable in a single unit.

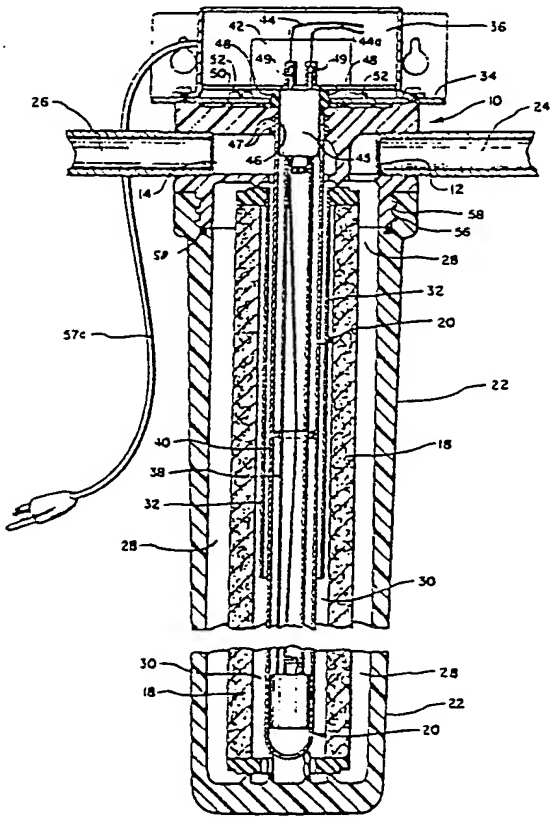

FIG. 3

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channel 28 through the filter from its outer surface to and out of the inner surface. Lengths between about 8 to 25 inches have been found satisfactory in use.

The inner diameter of the filtration means is somewhat larger than the outer diameter of the irradiation means 20 to provide an inner water channel 30 between them into which the water flows after passing through the filter.

In passing through the filtration means the water is purified by mechanical removal of suspended particles which are caught and held mechanically in the particles of activated carbon which also purify by chemical adsorption.

In flowing through inner channel 30, which preferably is of short radial length, the water is sanitized by exposure to ultraviolet rays from the irradiation means 20.

In order to assure a path of flow of all the filtered water in inner channel 30 which is long enough to effect thorough sterilization by irradiation, a flow directing means 32 is preferably installed in the outlet end of the inner channel to force water emerging into channel 30 from the filter 18 to flow in the part of water channel 30 between the filter 18 and the flow control means 32 toward the closed end of the housing 22 for a significant distance, e.g., at least about half of its length and preferably almost its entire length. At the inner end of the flow directing means 32 the water from that portion of the filter opposite the flow directing means 32 joins the water which has emerged from the other part of the filter 18 and the combined streams flow toward the head in that portion of the channel 30 within the flow directing means 32 to and out of the opening 33 into water outlet 14. The flow directing means, which preferably is a hollow cylinder of proper diameter to provide water channels on each side of it, may be made of any desired material but preferably is made of material which is transparent to the ultraviolet rays, e.g., quartz, U-V-transparent plastic, e.g., Teflon, and the like.

A bracket 34 is provided to support a power supply box 36 on the head 10, as later described, to receive electric power of usual household voltage, e.g., 110 to 120 volts, through a power connection 55c and to transform it into a proper higher voltage source of power, which will vary according to lamp design.

The irradiation means 20 comprises an ultraviolet lamp 38, e.g., an ozone or non-ozone lamp, and a quartz sleeve 40 which is transparent to U-V rays.

The quartz sleeve 40 is frictionally held in the head 10 in an accurately machined hole 46 slightly larger in diameter than the outside diameter of sleeve 40 and provided with grooves for O-rings 47. This construction assures a water-tight frictional connection of the quartz sleeve 40 with the head 10, permitting these parts to be handled freely as a unit.

The lamp 38 is frictionally held in power box 36 by means of a flanged rubber sleeve 48 which is secured to bracket 34. It tightly engages the lamp terminal 45. Terminal 45 is provided with the customary power prongs 49 which go into electrical contacts in electrical receptacle 42 connected by lines 44 and 44a to the high voltage terminal (not shown) within power box 36. This electrical connection further frictionally supports lamp 38 in the power box 36. The frictional connection of lamp 38 in power box 36 permits the lamp to be removed from quartz sleeve 40 while the sleeve is held in water-tight connection in the head 10. This water-tight connection is an important feature of the invention because it permits the lamp to be removed from or inserted in sleeve 40, as desired, without affecting in any way the filtering function of the apparatus. This is of particular importance in the multiple unit utilization of apparatuses, as later described.

The bracket 34 is adapted to be secured to the head on integral posts 50 by means of bolts 52 passing through holes 53 in the bracket aligned with the screw recesses in the ends of the posts 50. It also has a central hole through which electrical connection is made to lamp 38, as best seen in FIG. 2.

The power supply box 36 is fastened to bracket 34 in any suitable manner so that it is located above the head 10, e.g., by bolts 55 passing through holes 55a in flange 36a into threaded openings 55 b in bracket 34. The power supply box 36 receives current through supply line 55c from a commercial source and supplies it at proper higher voltage to the lamp 38 by means of the receptacle 42 and supply lines 44 and 44a. A fuse 60 may be put in line 55c, if desired. It is also desirable to provide means to indicate when lamp 38 is operating. For example, a crystal piece 62 may be mounted in the depending flange of bracket 34, as seen in FIG. 1, behind which is a light passage extending from the surface of head 10 into the interior of the quartz sleeve 40. When lamp 38 is illuminated, the light passes upwardly through the light passage and illuminates the crystal piece 62. In some cases it may be desired to provide remote indication of the illumination of lamp 38 and this may be done by electronic means that operates some kind of indicator at a remote location when lamp 38 is operating.

The head 10 and housing 22 may be connected together by any suitable means, e.g., an internal thread 56 in the head 10 and an external thread 58 on the housing, as seen in FIGS. 2 and

11. An apparatus as set forth in Claim 14 in which said apparatus includes an ultraviolet lamp mounted in said quartz sleeve.

12. An apparatus as set forth in Claim 20 in which a flow directing means in the form of a cylinder is provided to compel the water passing through the said filtration means to flow away from said head for the length of said flow directing means and then merge with water flowing through said filtration means beyond said flow directing means and flow out of the apparatus through said outlet opening in said head.

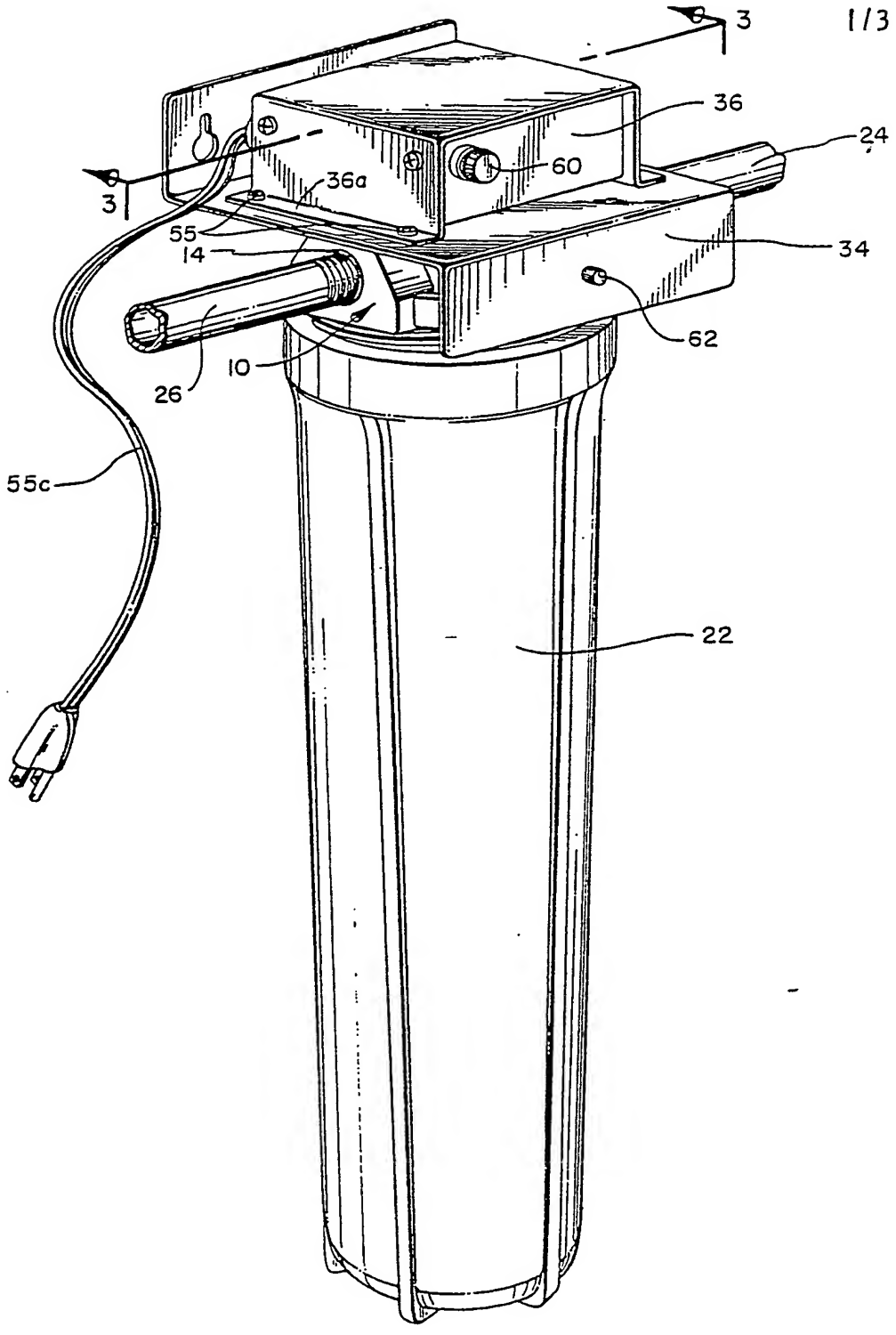

FIG. 1

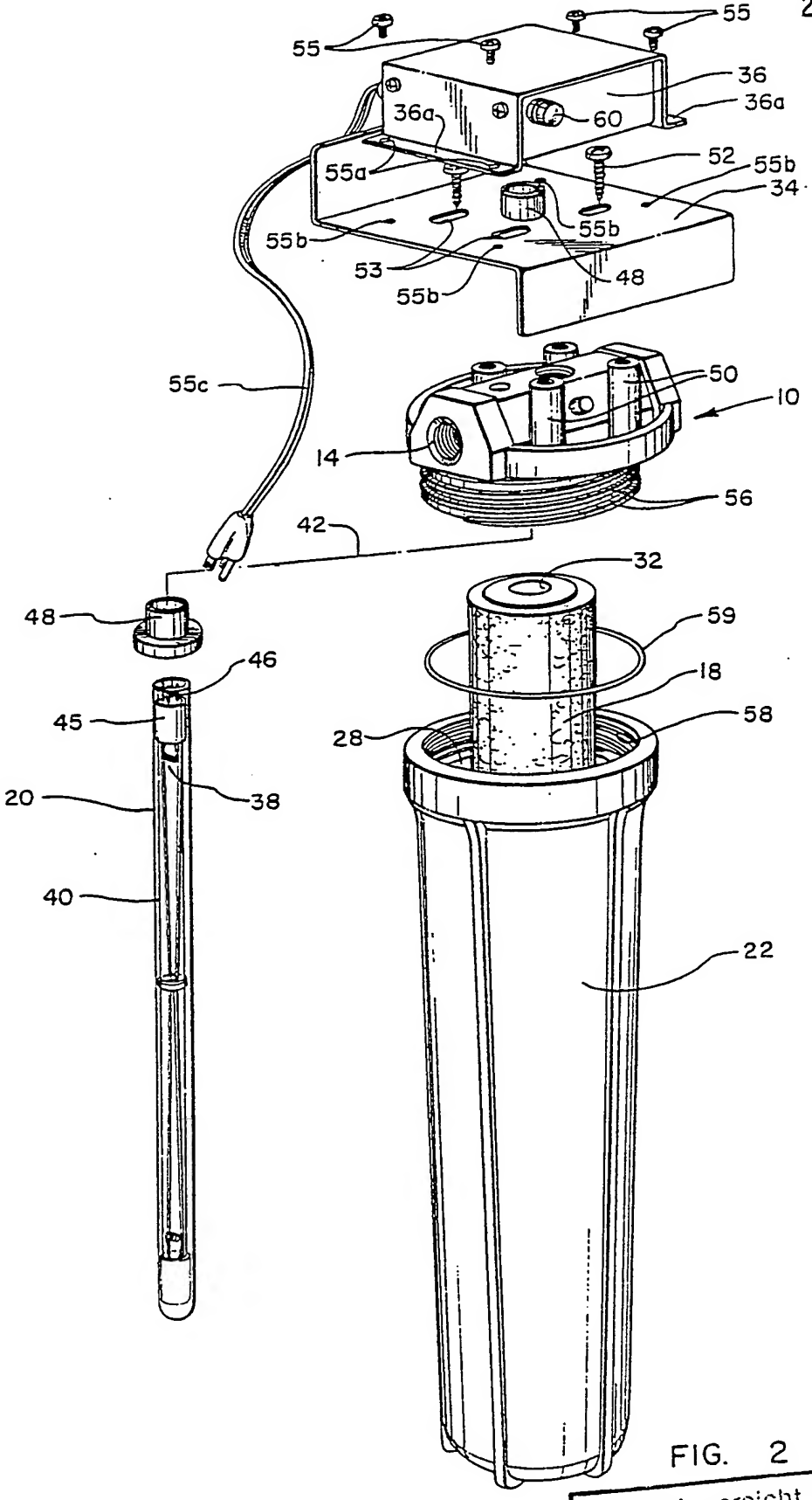

FIG. 2

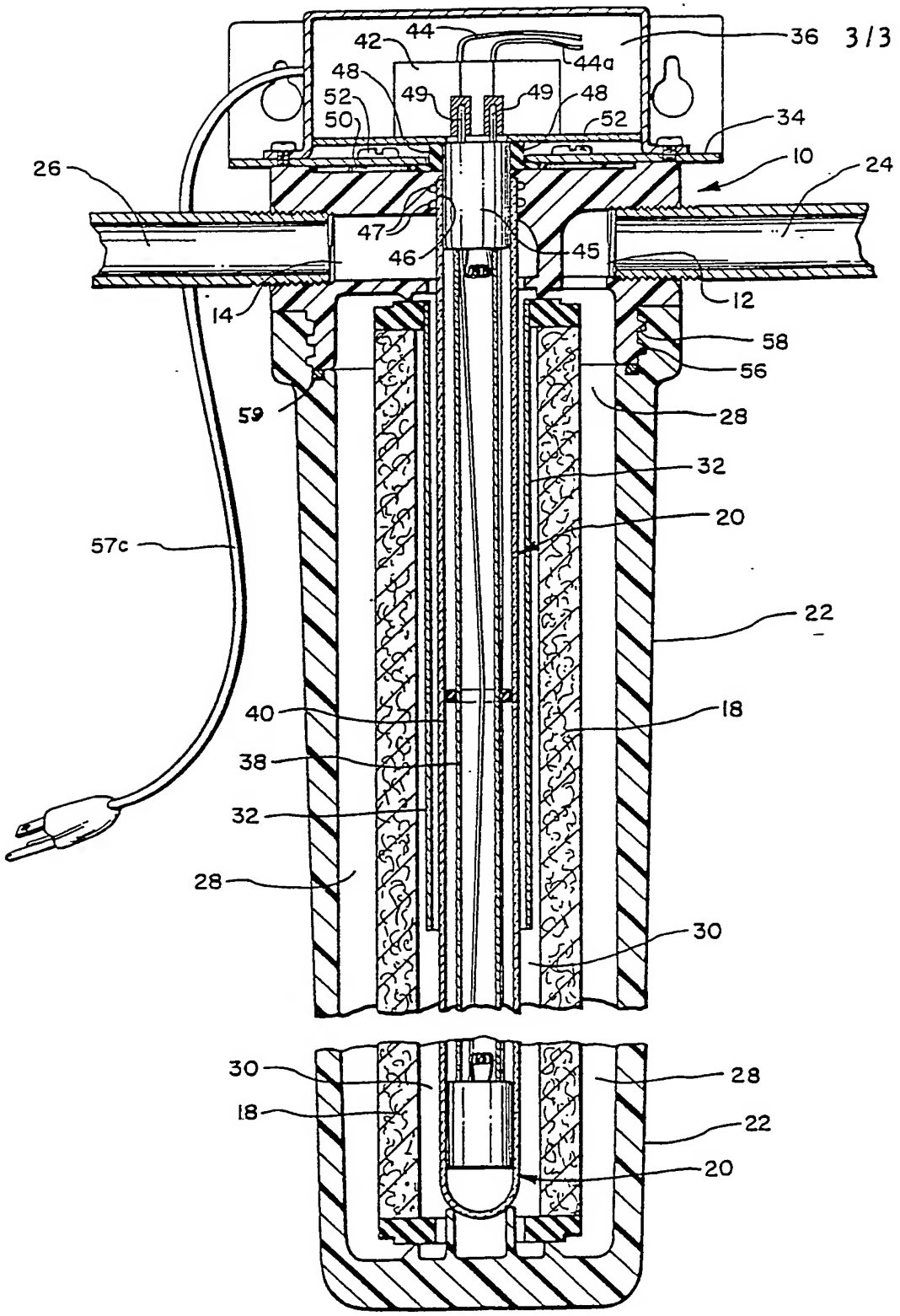

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number

EP 88 11 8436

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE-A-2 342 428 (F.W. DÜKER) * Pages 6-8 *	1-12	C 02 F 9/00 C 02 F 1/32 C 02 F 1/28
X	US-A-3 551 091 (L.P. VELOZ) * Column 3, line 9 - column 4, line 14; figure 1 *	1,3-12	
X	DE-A-3 441 535 (E. RASCHE) * Pages 8-10 *	1,3-6,8-12	
A	US-A-4 694 179 (H.S. LEW et al.) * Whole document *	1-11	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

C 02 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-02-1989	VAN AKOLEYEN H.T.M.

CATEGORY OF CITED DOCUMENTS

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